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SUGGESTIONS FOR THE STUDY OF THE LACTARIAE.*

BY GERTRUDE SIMMONS BURLINGHAM

There are only a few species of *Lactaria* which can be identified positively from dried specimens in the absence of field-notes. Furthermore, one who is not more or less familiar with the distinguishing characteristics of the species in this genus may make seemingly ample notes and yet omit some of the vital points, with the result that much otherwise valuable material becomes worthless or even misleading. Any such waste of time and material is especially lamentable in view of the fact that only a few scattered regions in the United States have been explored at all for any genus of the fleshy fungi. Approximately ninety species and varieties of *Lactaria* have been reported from the United States, fifty† of which have been described as new species; but of this number only five have been described from states west of the Alleghany Mountains, while from the majority of the states west of this line no species whatever have been reported. An economic as well as a scientific interest attaches to the genus, since *Lactaria deliciosa* and *Lactaria volema* are among the choicest of the esculent mushrooms, and several other species are considered nearly as palatable.

The generic characters are conspicuous. The exudation from cuts and bruises in the flesh or gills, of a white or colored juice having the consistency of milk, is usually sufficient to mark the specimen as a *Lactaria*. In common with the *Russulae*, the *Lactariae* have a vesiculose structure which gives the flesh of both the stem and the pileus a cellular appearance much like pith, and in consequence of this structure the flesh is readily broken and is never fibrous or tough, and the stem is never cartilaginous. The genus is characterized also by the occurrence

* In Tent. Disp. Meth. Fung. 1797, Persoon uses the term *Lactaria* as a generic name, thus antedating the *Lactarius* of Fries by nearly half a century. At the time of publication of "Some Lactarii from Windham County, Vermont," I was unable to obtain this book for consultation.

† It is possible that some of these may prove not to be good species.

in many species of concentric bands of deeper color on the surface of the pileus, producing what is termed a zonate pileus. The *Lactariae* are found chiefly in woods or on the border of woods, and they vary in size from species with the pileus less than 2 cm. broad to species having a pileus 15 cm. or more across.

MILK. — The first field-note to be made is regarding the color of the milk and whether the color changes upon contact with the air. Sometimes when the milk is at first white and then changes to some shade of yellow, the change comes so rapidly that careful observation is necessary to detect that the milk is white at first. This is true in *Lactaria resima*. Again a change may not be noticeable for several minutes. A collector should always be positive as to whether or not the color of the milk does change upon exposure to the air. It may be that wounds will be discolored, while the milk remains white, as in the case of *Lactaria volema*, in which the gills and flesh become brownish where injured. *Lactaria fuliginosa* has white milk which according to European mycologists changes to salmon. In the American species the gills and cut flesh show the change very decidedly but a drop of the milk remains white except where in contact with the flesh. In order to distinguish between such changes, it is necessary to watch a large drop of milk until satisfied as to the truth. It is always well to state in the field-notes "milk white, unchanging" or "milk white, changing" in order to indicate that such careful observation has been made.

It is also necessary to know the taste of the milk. This may be mild, that is with no decided taste, or sweetish, or the milk may be mild at first and in fifteen seconds or more become peppery on the tongue; sometimes it is bitter and astringent, and again it may be extremely acrid from the first as in *Lactaria piperata*. Since the taste differs sometimes in young and old specimens, it is best to taste more than one. None of the *Lactariae* so far as is known are extremely poisonous, and there will be no danger in tasting the milk, but it will be advisable not to swallow the juice.

PILEUS. — One of the distinguishing points of a species is the

color of the pileus. Not only is this a variable character, but two collectors may describe the same color in different terms. Much difficulty can be avoided if a collector uses some standard color scheme, as Saccardo's *Chromotaxia*. Perhaps the most complete and satisfactory color chart is *Répertoire de Couleurs* published by the French Society of "Chrysanthémistes," which gives 365 distinct colors in various tones, including the reproduction of the colors recognized by Saccardo. The color description should be made as soon as possible after collection and should include the color of young, mature, and old specimens. If the pileus is zonate, the zonation should be described carefully.

It is also necessary to note the character of the surface of the pileus. In some species the pileus is never viscid, in others viscid only in wet weather, and in still other forms, the viscosity is more or less persistent. When *Lactariae* are collected in dry weather, special means must be used to determine positively whether the pileus is viscid when wet. This may be determined by standing the mushrooms in water for a short time or by placing them in the grass where they will be covered with dew during the night. As a rule the other surface characters will be preserved in drying, but sometimes these may be fugacious. For example, the pileus of young plants may have a tomentose covering in whole or in part, which will disappear in the mature specimens. The extreme edge of the pileus is often minutely tomentose at first and later glabrous. On the other hand, the pileus may be glabrous at first and later squamulose or rimulose. Any such peculiarities should be mentioned in the field-notes.

GILLS. — The color of the gills should be observed both in young and mature plants, and note made whether the color changes with age, or where the gills are wounded. Although the arrangement of the gills can be told from the dried specimen, it can be determined more readily from the fresh mushroom. This is especially true in cases where the gills branch. A drawing showing the number of gill series, the branching and the closeness is better than a description. The color of the spores differs in the species, so that a rough spore-print ought to be made in order to see the color in mass.

STEM. —The important points in connection with the stem are the color, shape, character of the surface, and the texture of the flesh, that is, is the stem pithy at first, then hollow, or is it firm even in old age?

HABITAT. —The character of the habitat is of special consequence; whether pasture, woods, open groves, or swamp; the kind of trees predominating in the immediate vicinity, and the species under which the fungi were growing; the kind of soil and the moisture content; the locality and the elevation. Also, is the species solitary or gregarious in habit, and what size do the mushrooms attain?

COLLECTING AND PRESERVING. —Of course it is of primary importance that the different specimens or "numbers" gathered should be kept distinct. This is easily accomplished by carrying in the collecting basket a supply of various sized paper sacks, and a species may then be placed in a bag with the accompanying field-notes. Like care must be used during the process of drying the mushrooms; for the mushrooms must be dried and preserved, since the descriptions are as useless without the dried specimens as are the latter without field-notes. The *Lactariae* may be dried successfully by spreading them on a wire screen which may be put under the kitchen stove or suspended about three feet above it. Oven heat is liable to be too great for the best results. When possible, three or four typical specimens of a species should be preserved, representing both young and mature condition. When dry, the mushrooms, together with the field-notes, may be transferred to paper sacks again, or to suitable boxes, and filed away for future study and identification. If some time is to elapse before this study is to be undertaken, something like naphthaline flake ought to be put in the boxes to protect the mushrooms from the attacks of the larvae of moths and carpet beetles.

The following outline contains the essential points for field-notes and at the same time a minimum amount of information necessary for the determination of species. Of course, it is evident that drawings or water-color sketches will be a valuable addition to the notes. The appended bibliography will form a working basis for the identification of the *Lactariae*.

Locality.....Date.....
 Habitat.....
 Milk
 color.....change.....taste.....
 Pileus
 color, zonate or azonate.....
 surface, dry or viscid.....
 glabrous or pruinose, squamulose, pubescent, tomentose

 margin, glabrous, pruinose, downy, tomentose,.....
 even or striate.....
 Stem
 color.....shape.....
 surface, dry or viscid.....
 glabrous, etc.....
 substance, solid, or lax, becoming hollow.....
 Gills
 color.....does the color change with age.....
 where bruised.....
 number, distant or close.....
 arrangement, entire or branched, number of series.....
 Spores
 color in mass.....
 Flesh
 color, does it change where broken.....
 odor.....
 Size of plants.....
 Solitary or gregarious.....

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ADDITIONS TO THE TREE FLORA OF THE UNITED STATES

BY J. K. SMALL

In a previous paper * I recorded the discovery of six trees new to the flora of the United States. Four of the species there mentioned, namely *Quercus Rolfsii* Small, *Ilex Krugiana* Loesener, *Rhus leucantha* Jacq., and *Tetrazygia bicolor* (Mill.) Cogn., are indigenous to Florida, while two species, *Mangifera indica* L., and *Sapota Zapotilla* (Jacq.) Coville (*Achras Sapota* L.) are naturalized plants.

Further exploration in South Florida has revealed six additional arboreous plants, which are as follows:

SERENOA SERRULATA (Michx.) Hook. As far as we are aware, throughout the range of this species in North Carolina, South Carolina, Georgia, and northern Florida, the stem never rises above the surface of the ground. In South Florida, under quite similar conditions, the stem not uncommonly stands erect or

* Additions to the Flora of Subtropical Florida. Bull. N. Y. Bot. Gard. 3: 419-440. 1905.